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JUNIOR HIGH SCHOOL STUDENTS' MATHEMATICAL PROBLEM SOLVING ABILITY ON TWO VARIABLE LINEAR EQUATION SYSTEM

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ABSTRACT

The purpose of this study was to find out how well class VIII students of SMP were able to solve math problems on SPLDV material. The approach used was descriptive-qualitative, where in this study students were asked to take a problem-solving ability test with a minimum score limit of 10 and a maximum of 30 points, and the test instrument consisted of four essay questions that had been prepared. Ready. tested for high validity, high reliability, high differentiability. good, and moderate difficulty. for the research data analysis process the researcher used excel 2019, by dividing the scores obtained by students with the maximum score then multiplied by 100%. The research was conducted on 14 class VIII students of junior high schools in Bandung Regency who took part in this research. The mathematical problem-solving abilities of class VIII students are identifying elements that are known, asked, and the suitability of the elements needed in the very low category, formulating mathematical problems or formulating mathematical models in the low category, applying everyday problem-solving strategies in the high category, and Explain or interpret the results according to the initial problem in the very high category.

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INTRODUCTION

Education can be called a barometer of a country, the quality of education can be one of the indicators of the progress or development of a nation. Johar in (Suryani et al., 2020) stated that the progress of a nation is often measured by the quality of its educational system. The

competence of students in solving matters of calculation, science, and reading, as well as their application in everyday life, is used to determine whether or not special education is appropriate for compulsory age. In formal education, the achievement of educational objectives is a measure to determine educational performance, therefore the maintenance of education can not be separated from the objectives (Dini et al., 2018) say that in formal education the achieving of the educational goals is the measure for determining the performance of education, hence theining of education cannot be separate from those objectives.

In formal education, many branches of science are studied, one of which is mathematics, Mathematics is one of the disciplines that are many studied on the school bench. Students teach mathematics at every level of education. (Ruswati et al., 2018). This is reinforced by (Purnamasari & Setiawan, 2019) which says that one of the subjects students learn in schools and play an important role in shaping human thinking especially in everyday life is mathematics. Learning mathematics is not only about working, but also plays an important role in everyday life. This is in line with the Statement (Linda et al., 2020) that states that mathematics is a subject that everyone should learn because of its importance in everyday life including in developing a mindset and finding solutions to problems. This is also confirmed by (Nurhikmayati, 2019) who says that learning mathematics can help a person develop his cognitive, emotional, and psychomotor talents, in addition to his/her cognitional abilities in the sense of good computing. In addition, (Putra et al., 2018) said that learning mathematics teaches students how to connect ideas and answer problems logically, analytically, and systematically. Based on some of the above confirmations, it can be concluded that mathematics is a subject that plays an important role in developing human understanding, especially in everyday life. In addition, learning mathematics teaches students how to connect ideas and answer problems logically, analytically, and systematically.

Every problem affects everyone, whether it's a problem in everyday life or in maths. (Ulfa et al., 2022). In the implementation of mathematics in everyday life, humans often use math to model events that occur inside and around them. (La'ia & Harefa, 2021). Events in everyday life are often represented mathematically so it is easy to solve. The ability to solve problems that include understanding problems, developing models, identifying solutions, and analyzing such solutions, is one of the goals of learning mathematics. (Latifah & Luritawaty, 2020). Similar to the purpose of learning mathematics according to Permendiknas, (Hidayat, 2017) stated that. The purpose of learning mathematics is to cultivate students' creativity through the stimulation of intuition, creativity, and discovery caused by curiosity, as well as to train students' ability to understand something through thinking and thinking to make a conclusion. In order to be able to formulate predictions or hypotheses to solve a problem, build problem-solving skills, and improve communication and information transmission skills, one must engage in different original thinking. Some of the above arguments state that problem-solving skills are one of the learning goals that can be drawn from some expert opinion statements. Problem-solving skills are also important for success in everyday life.

Not only in mathematics, problem-solving skills are also important in everyday life, it's in line with (Rianto et. al 2017) saying that problem solving abilities are essential for learning as well as for daily life. Students should use problem solving as their initial step in formulating ideas to acquire new knowledge and enhance their math skills. Based on the above reinforcements, it can be concluded that problem-solving skills are important to each student as a supply to solve problems, not only in mathematical problems but also in solving problems in everyday life. As for the stages in problem-solving (Hernawan & Setiawan, 2021) among them 1) Understanding problems; At this level, problem solving efforts are focused on helping students in understanding the realities of the problems and questions

posed. 2) Make a plan to solve the problem. Without good planning, a problem will not be solved or found at this stage. Students are instructed to choose the best strategy or approach to problems when dealing with planning problems. 3) Put a plan into action to fix the problem. At this point, students run the plans and/or solutions they choose in Stage 1 and 2. Review the answers that have been provided. At this point, students should ensure that the results are accurate and do not contradict the questions asked.

Even though being able to solve mathematical issues is a very useful skill to have in everyday life, pupils' mathematical problem-solving skills are nevertheless still considered to be of a poor level. Although it's crucial to have strong problem-solving abilities, many pupils still have trouble with arithmetic difficulties (Dewi et al., 2019). The low ability of students to solve problems can be caused by several factors. Many factors, such as early experience, prior knowledge of mathematics, motivation, and the structure of the problems offered to students, have an impact on low problem solving abilities. Furthermore, students who only focus on information or subject matter and problem solving algorithms rather than developing their problem solving abilities have a negative impact on students' problem solving abilities (Dewi et al., 2019)

In mathematics subjects, SPLDV material is one of the more challenging and demanding ability to solve problems in its solution. In addition, the material of the Two Variable Linear Equations System (SPLDV) is also very closely related to everyday life, the ability of students to solve mathematical problems in learning activities can be utilized on the SPLDV material. this is in line with (Achir et al., 2017) the Linear equations system of two variables (SPLDV) is one of the mathematics tools that presents questions based on context (contextual issues), where the questions presented are directly related to daily life. Learning activities that are contextual can be loaded in the SPLDV material can begin with the activities of presenting questions that are directly related to everyday life in the model about SP LDV, this is in line with (Maspupah & Purnama, 2020) Making a form of linear equation of two variables (PLDV), making a model about the linear system of the two variable equation (SPLDV), and writing the resolution of problems associated with SPLD V is only a small part of the learning activity in the content of SPLDV.

Based on the above things emerged the thought to research related to Mathematical Problem Solving Ability Analysis of students of class VIII on SPLDV material. This study aims to describe the mathematical resolution ability of students on the SPLDV material in writing based on the indicators of mathematic problem resolution, and the mathematic problem solving indicators Based on the above factors, then the concept of the implementation of the research Analysis of Mathematical Problem Solving Ability of students of Class VIII on the matery SPLDV arises. Based on mathematical problem-solving indicators, this study seeks to describe students' ability to solve mathematic problems on SPLDV material in writing, as well as the mathematics problem- solving indicator according to sumarmo in (Sundayana, 2019) that is to determine the known aspects, what is demanded from it, and whether it is adequate, build maths models or formulate maths problems, put solutions to common problems into everyday life, describe or interpret findings based on the original problem, and make meaningful use of maths.

METHOD

The aim of this research findings was to describe how the ability of class VIII students in solving mathematical problems on SPLDV material. The method used in this research is descriptive with a qualitative approach. this is consistent with (Jayusman & Shavab, 2020) When conducting descriptional research, the objectives are explicitly stated, strategies to them are planned, and various types of data are collected to form the basis of the report. As for the

study conducted in one of the SMEs in Bandung, this study involved 14 students. The problem-solving skill test consists of four questions that are summarized in terms of description. The tests have been validated and found to have a high level of reliability, high levels of discrimination, moderate levels of difficulty, and categories of easy, medium, and difficult for the type of subject. Each item has a minimum score requirements of 10 points and a maximum score requirement of 30 points. By analyzing the test results and student responses, the study calculates the level of student problem-solving skills as they apply them to SPLDV content issues. According to Arikunto in (Waskitoningtyas, 2016) which aims to obtain a score of each item, with the following formula:

$$p = \frac{n}{N} \times 100\%$$

Identifying:

P = Presentation of Indicators

n = Multiple frequency indicators

N = Maximum value of the total amount

With the following criteria :

Table 1 Criteria for assessing problem-solving ability

Value (%)	**Criteria**
$0 < x \leq 40$	Very Low
$40 < x \leq 50$	Low
$50 < x \leq 70$	Medium
$70 < x \leq 90$	High
$90 < x \leq 100$	Very High

On the above table of criteria for assessing the ability to solve mathematical problems, it can be concluded that the categories of the students' ability to resolve the mathematics are Very Low, Low, Medium, High, and Very High.

RESULTS AND DISCUSSION

Results

The results of the research were obtained by providing test instruments in the form of SPLDV material description of 4 elements containing indicators of the ability to solve mathematical problems. There are five criteria for assessing problem-solving capabilities: very low criteria with a percentage value between 0 and 40%, low criteries with percentages between 40 and 50%, moderate criteria between 50 and 70%, high criteria, with percentual value between 70 and 90%, and very high criteries, with percent between 90 and 100%.

As for the results of Percentage of responses of students of class VIII on SPLDV material calculated per indicator is presented in the table below:

Table 2. Indicators of Mathematical Problem Solving Ability

No matter	Indicators	percentage (%)
1	Identify the elements known, questioned, and the suitability of the necessary elements	25%
2	Formulate math problems or formulate mathematical models	50%
3	Implement strategies to solve everyday problems	85%
4	Explain or interpret the results according to the initial problem	92%
Ability to solve math problems		63 %

Analysis conclusions from table 2, see There are four indicators and percentage achievement capacity to solve math puzzles. The results of the first indication, which involves the identification of known factors, what questions are asked, and whether those elements are sufficient, show that the average achievement is 25% and belongs to a very low category. Average achievement on the indicator making matters in mathematics or building mathematical models is 50% and belongs to the Low group. In addition, the average output of indications of the use of strategies in solving daily problems was 85% and was included in the high group. Average achievement was 92% obtained on the evaluation indicator based on initial problems and entering the very high category.

In answer to question number 1, many students who fail to work on the mathematical problem solving problem that is present on the first indicator are paying attention to the aspects understood, questioned, and the suitability of the necessary elements.

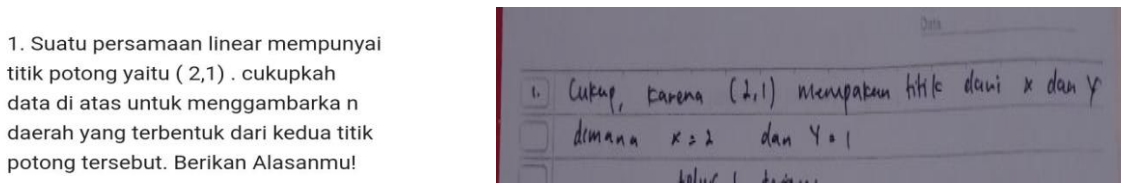

Figure 1. Question and Answer No. 1

Based on the examination of figure 1, many students who have difficulty solving the mathematical questions that are present on the first indicator, i.e. know the known elements, which are asked, and the suitability of the elements required language should be the interpretation of the results rather than the repetition of data analysis.

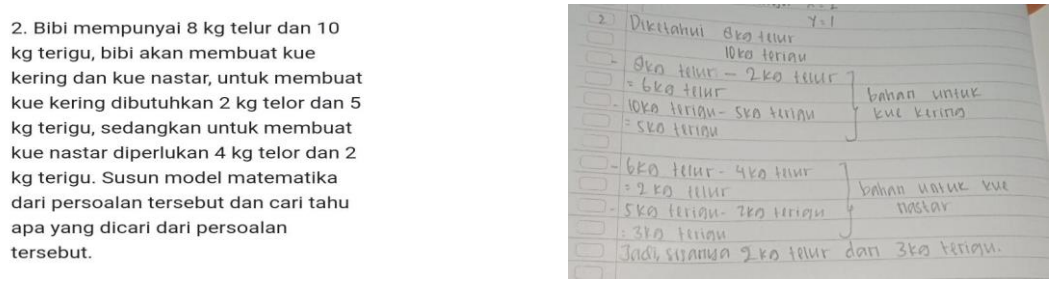

Figure 2. Question and Answer No. 2

A study of the answer to question figure 2 revealed that some with a second indicator of their ability to make a mathematical problem or model felt difficult for most students.

3. Pak anto adalah seorang tukang parkir di pasar cibereum. Ketika pak anto memarkirkan 2 buah mobil dan 3 buah motor pak anto mendapat uang sebesar Rp. 20.000 sedangkan ketika memparkirkan 1 buah mobil dan 2 buah motor pak anto mendapat uang sebesar Rp. 8.000. Hari ini ada 5 mobil dan 7 motor yang terparkir didepan pasar. Kira-kira berapakah uang yang akan diperoleh pak anto ?

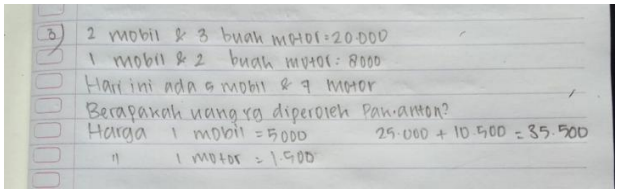

Figure 3. **Question and Answer No. 3**

According to figure 3 study results, the majority of students are able to successfully complete math tasks that test their ability to apply solutions to real-world problems.

4. Faiz membeli 1 kg anggur dan 2 kg apel seharga 20.000, sedangkan asfar membeli 2 kg anggur dan 3 kg apel seharga 15.000. Dapatkah kamu prediksi harga apel dan anggur per-kgnya ? coba tunjukan!

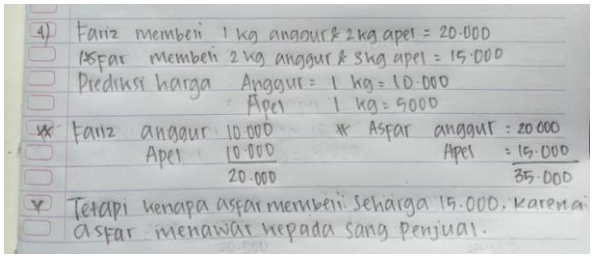

Figure 4. Question and Answer No. 4

According to the analysis of figure 4, most students can work on the question accurately on the indicator explaining or interpreting the findings according to the initial question.

Discussions

Students' response findings as seen in Figure 1 indicate that they are unable to recognize the known, requested elements, and the suitability of the required elements. In the first question, the student must decide whether the cut point is sufficient to form a surface or not. Because of the student's misunderstanding of the problem, many mistakenly believe that one line of student can be used to produce a range derived from the equation or only one x and one y. this is consistent with (Indriana & Maryati, 2021) students cannot meet these criteria because they do not understand the subject properly. Since the answers to these questions are less accurate, it can be concluded that this initial indicator falls into a very low category.

Based on Figure 2 above, it is clear that at the time of working on the indication of constructing a mathematical problem or creating a math model, the student's answers are wrong. At issue 2, the student's task is to create a mathematical pattern of a situation of everyday life. Students who do not understand the topic can make mistakes when dealing with these challenges. this is also consistent with (Ferdianto & Yesino, 2019) Misunderstandings among students continue to be a major contributor to mistakes in data and organizational modeling. Students are still in the learning stage; understanding or analysis has not yet occurred. Most students give the wrong answers so it can be concluded that the size of this second student's mathematical problem-solving ability belongs to the low category.

Students who find less appropriate solutions are found when trying to solve problems that require mathematical problem-solving skills shown in illustration 3 above. Students are asked to use the general problem-solving method to determine the values x and y on the questions presented in question number three. Few students answer questions 3 incorrectly, but it is clear from the inadequate answers that students do not have the ability to apply mathematical models to real-world problems. based on previous research conducted by (Novitasari & Wilujeng, 2018) Some students may have given inaccurate responses because they cannot understand the problem or may misinterpret what is asked on the question. It can be said that the High category includes the ability to apply indicators to solve math problems, including finding solutions to challenges faced in everyday life.

Figure 4 illustrates the student's incorrect response to a mathematical problem that is part of an indicator that explains or interprets the results depending on the actual problem. While some students have problems with questions 4, the majority of students are able to solve problems accurately and ultimately ensure the x and y values. Some students do this incorrectly because they only remember examples of frequently asked questions.Afriansyah in (Nurhasanah & Luritawaty, 2021) the student's learning process relies on hafalan because math teachers are not fully involved in meaningful teaching.

CONCLUSION

Based on the research conducted against 14 students of class VIII of one of the SMPs in Bandung, the ability of students of grade VIII in solving mathematical problems is in the category Sedang. Where there is one indicator that belongs to the Very Low category, namely Identifying known elements, questioning, and the suitability of the required elements, on other indicators, such as indicators formulating mathematical problems or compiling mathematic models, fall into the low category, while the other two indicators fall in the high and very high categories. The ability of the students to solve mathematical problems on the indicators of identifying known elements, questioned entering the category is very low, this is due to the student's inability to understand the basic concepts, they only focus on the formulas and operations on the equation alone, and even their lack of understanding of the differences between systems and equations all affect their ability to identify the elements known, asked, and the suitability of the elements find very low categories. So to overcome this need to be further enhanced in the understanding of the essential concepts to increase the knowledge of the basic ideas especially on SPLDV material.

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